

## TREATMENT OF SUBLUXATION INJURY CONCOMITANT WITH CORONAL FRACTURE: A CASE REPORT

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**Abstract:** Traumatic dental injuries are not only a serious public health problem, but they are also the most common injuries among children according to the epidemiological data. Subluxation is defined as the loosening of a tooth without displacement. Coronal fractures are the most common injuries. Considering the treatment options, which are suitable for the concomitant occurrence of these two traumatic injuries, there are only limited number of studies in the literature. In the concomitant occurrence of these two trauma types, like in other traumatic injuries, if the treatment is not implemented timely, long-term problems may develop. The objective of this case report was to describe the therapeutic approach to the subluxation concomitant with a coronal fracture.

**Key words:** Composite restoration, Crown fracture, Dental trauma, Luxation injury, Paediatric dentistry, Subluxation.

### INTRODUCTION

Subluxation is defined as the loosening of the tooth without displacement (1, 2). The intraoral examination of the subluxated teeth may reveal increased mobility and sensitivity to percussion. Bleeding in the gingival sulcus may accompany this clinical condition. Radiological examination shows that the tooth is in its socket and in its normal position (1). In subluxated teeth, the periodontal ligament is not completely torn but the neurovascular support of the pulp is damaged. Electrical pulp testing may provide negative results until the blood perfusion to the pulp is restored (1). Therefore, in respect of the prognosis, colour change and the emergence of the periapical radiolucent lesions are more acceptable diagnostic criteria (1, 3). Therapeutic choices in the subluxation vary from the follow-up without any invasive intervention to the tooth extraction (2, 4). Crown fracture is a type of injury, in which a

part of the enamel is lost due to the impact of a vertical or oblique force on the incisal region of the tooth. Regarding the possible complications and the development of the sequelae, the clinical progress is milder compared to the luxation injuries (5).

Traumas may cause also several other injuries along with the hard tissue injuries. Although there are several guidelines for the coronal fractures and luxation injuries treatment (5, 6). There are only limited investigations focused on the subluxation injuries concomitant with coronal fractures (5, 7). In this case report presented the one-session treatment of the coronal fracture concomitant with the luxation injury.

### CASE REPORT

A 12-year old girl, who applied to the clinic with the complaint of fractures in the teeth 11 and 12. The initial examination showed that she fell in the school just 10 minutes before her admission to the clinic and had an uncomplicated coronal fracture and subluxation injury, which was determined with the presence of the bleeding in the sulcus and sensitivity to percussion (Figure 1). We did not observe any increase in the mobility and any other pathological finding in the radiological examination. As the control, which was done with the electric pulp testing, (Parkell Gentle Pulse, Parkell Electronics, USA) showed that the teeth



Figure 1. Initial appearances

were vital and had a response within the normal limits, we decided for a composite resin restoration in one session. The tooth colour was determined with the colour scale of the Style Italiano My Shade Guide (SmileLine, CH). CE enamel (Estelite Sigma Quick, Tokuyama Dental, Japan) and OA2 and OA3 dentine (Estelite Sigma Quick, Tokuyama Dental, Japan) composite materials, which will compose the decided colour, were placed on the teeth with a thickness less than 0.5 mm and polymerized with light for 10 seconds (Figure 2a). The colour of the dentine and enamel layers were determined with the help of the picture taken with Cross Polarizer Filter (Smile Lite MDP, SmileLine, CH) (Figure 2b). After the enamel and dentine colours to be used were determined, the composite residues on the buccal surface of the teeth were removed. The teeth were cleaned with a 2% chlorhex-



**Figure 2a.** After placing composite parts



**Figure 2b.** Appearance with cross polarizer filter



**Figure 3.** Silicon matrix



**Figure 4.** Roughening the fracture line



**Figure 5a.** Etching



**Figure 5b.** Bonding

xidine gluconate solution (Klorhex, Drogan, Turkey) and the maxillary teeth were recorded without pressure application. Following the mock-up, silicon matrix was formed with Type C silicon (Zetaplus, Zhermack, Germany) (Figure 3).

After the placement of Optra Gate (Ivoclar Vivadent AG, Liechtenstein) for isolation, etching was performed on the buccal enamel surface with the black coloured polishing disc (Rainbow, Shofu Dental, Japan) in order to roughen the fracture line (Figure 4). Following the application of orthophosphoric acid (Scotchbond Universal Etchant, 3M Espe, Germany) and bonding (Single Bond Universal Adhesive, 3MEspe, Germany), (Figure 5a, 5b) the silicon matrix was placed and the



*Figure 6. Final Appearances*



*Figure 7. Follow-up 8th weeks*

enamel and dentine composites were inserted. The surface of the composite was protected with the glycerine gel (Liquid Strip, Ivoclar Vivadent AG, Liechtenstein) after the polymerization. The treatment was finalized with finishing and polishing (Rainbow Polishing Disks, Shofu Dental, Japan) (Figure 6).

Soft diet was recommended to the patient for 15 days and a training for the mouth hygiene was provided. In the follow-up controls in the 2<sup>nd</sup> and 4<sup>th</sup> weeks, we determined that the teeth were still vital, which continued also in the controls in the 6<sup>th</sup> and 8<sup>th</sup> weeks. There were no findings of resorption on the root surface and the patient and her family were satisfied with the cosmetic outcome of the restoration (Figure 7).

## DISCUSSION

Regarding the prognosis of the traumatic tooth, a timely and appropriate acute trauma planning and selection of the suitable treatment constitute the first step to the success (8). Trauma does not only damage the healthy structure of the tooth but also affects negatively the self-confidence and quality of life of the patient. Dental injuries caused by trauma, have a negative impact on the factors directly related to the quality of life of the patients like the restriction of the school and business life, sleep disturbances, impairment of eating and smiling (9). In addition, it was reported that both the child and his/her parents had more concerns about the cosmetic appearance than the symptomatic find-

ings (10, 11, 12). Therefore, first, the concerns of the parents about the aesthetic outcome should be relieved. The best way for the relieving of the aesthetic concerns of the patient is the implementation of the biomimetic permanent restoration as quickly as possible.

Teeth may be exposed to several different injuries due to the trauma. Studies have shown that pulp necrosis is more common if the luxation injury is accompanied by a complicated or uncomplicated coronal fracture (7).

Nevertheless, if the fracture involves enamel and dentine or enamel, dentine and pulp, the treatment should be initiated without wasting time (5). Depending on the localization of the fracture, dentinal tubules about 15,000 - 45,000/mm<sup>2</sup> are exposed (13). Depending on the low amount of the peritubular dentine, the width of the dentinal tubules, the closeness to the pulp and the high quantity of the dentinal tubules create a path for the bacteria to access the pulp and thus pulp disorders may emerge (14, 15). The exposed dentine in the uncomplicated fractures or the exposed pulp in complicated fractures should be covered with a suitable material and disconnected from the oral cavity (16). As it is well known that the posttraumatic composite restoration does not have the risk of necrosis, composite restoration can be directly implemented in the uncomplicated cases (8). In untreated patients with the suspicion of the luxation injury, the coverage of the exposed dentine with glass ionomer and the follow-up controls of the pulp is recommended. On the other hand, there is no doubt that if the pulp is intact, the treatment can be performed with the total-etching technique and resin-based composites (17). In this case, we were able to carry out the composite restoration immediately, as the time spent after the trauma was short, the mobility was within the physiological limits, there was no need for a dental splint and pulp responded positively to the vital metric testing.

There is only limited information about the recovery process after the bleeding and oedema in the periodontal ligament (PDL) following small traumas like concussion and subluxation. In a clinical luxation study, after the concussion trauma, the development rate of the surface resorption was higher compared to the subluxation (18). This finding indicates that in the injuries like the concussion, in that the tooth is not mobile within the socket, the pressure, which emerges due to the bleeding in the PDL, may damage the root surface. Considering the subluxation, the posttraumatic force moves the tooth and relieves the pressure (6). The findings of the surface resorption can be observed in the radiological examinations earliest in the 6<sup>th</sup> week (18). We did not observe any pathological finding in the follow-up controls in the 6<sup>th</sup> and 8<sup>th</sup> weeks.

## Conclusion

In cases, who have subluxation along with uncomplicated coronal fracture, treatment in one session is possible if the patient has a vital pulp, good cooperation and less concern about aesthetics. However, the long-term outcome should be investigated with further studies.

## DECLARATION OF INTEREST

The authors declare that there are no conflicts of interests.

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## Sažetak

# LEČENJE SUBLUKSACIJSKE POVREDE ISTOVREMENO SA PRELOMOM KRUNICE: PRIKAZ SLUČAJA

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Traumatske povrede zuba nisu samo ozbiljan problem javnog zdravlja, već su i najčešće povrede među decom prema epidemiološkim podacima. Subluksacija se definiše kao otpuštanje zuba bez pomeranja. Prelomi krunice su najčešće povrede. Obzirom na opcije lečenja, koje su pogodne za istovremenu pojavu ove dve traumatske povrede, postoji ograničen broj studija u literaturi. Kod istovremene pojave ova dva tipa trauma,

kao i kod drugih traumatskih povreda, ako se tretman ne sprovede blagovremeno, mogu se javiti dugoročni problemi. Cilj ovog izveštaja jeste opisivanje terapeutskog pristupa subluksaciji u kombinaciji sa frakturom krunice zuba.

**Ključne reči:** Kompozitna obnova, prelom krunice, povreda zuba, luksacijska povreda, pedijatrijska stomatologija, subluksacija.

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